Listing of Claims

Claim 1 (Previously Presented): A method of setting up a plurality of virtual circuits between a first end system and a second end system, said plurality of virtual circuits being set up on a network connecting said first end system to said second end system, each of said plurality of virtual circuits terminating at said first end system and said second end system, said method being performed in a device between said first end system and said second end system, said method comprising:

sending to said second end system a first signaling message requesting said plurality of virtual circuits to be set up;

receiving an acceptance message, said acceptance message indicating that a plurality of switches in a connection path between said first end system and said second end system have set up said plurality of virtual circuits, wherein said plurality of switches accept said plurality of virtual circuits but immediately provision fewer than said plurality of virtual circuits; and

sending a second signaling message to activate at least one of a plurality of not-yet-provisioned virtual circuits comprised in said plurality of virtual circuits.

Claim 2 (Original): The method of claim 1, wherein said first signaling message comprises a plurality of information elements, wherein a first information element is designed to request set up of a single virtual circuit comprised in said plurality of virtual circuits, and a second information element is designed to request set up of a second plurality of virtual circuits comprised in said plurality of virtual circuits, further comprising:

receiving an acceptance message indicating that only said single virtual circuit is possible to be provisioned if any of a plurality of switches in a connection path between said first end system and said second end system is designed not to support said plurality of virtual circuits.

Claim 3 (Original): The method of claim 2, wherein said second information element comprises a non-mandatory information element according to a specification, wherein non-

mandatory information elements can be ignored by said plurality of switches according to said specification.

Claim 4 (Original): The method of claim 3, wherein said specification comprises one of user to network interface (UNI) and network to network interface (NNI).

Claim 5 (Canceled)

Claim 6 (Canceled)

Claim 7 (Previously Presented): The method of claim 1, wherein said fewer than said plurality of virtual circuits corresponds to one virtual circuit such that only one virtual circuit is provisioned in response to said first signaling message.

Claim 8 (Previously Presented): The method of claim 1, wherein said plurality of virtual circuits is treated as a group of virtual circuits, wherein said first end system and said second end system support a plurality of groups including said group, said method further comprising maintaining a bundle structure associated with each of said plurality of groups, wherein said bundle structure stores information identifying the specific plurality of virtual circuits forming the corresponding group.

Claim 9 (Original): The method of claim 8, further comprising:

maintaining a plurality of call reference structures, wherein each of said plurality of call reference structures maintains the state of a call, wherein signaling messages related to each group are received on a corresponding call; and

maintaining a plurality of per-VC structures, wherein each per-VC structure stores information related to a plurality of call parameters accepted for a corresponding one of said plurality of virtual circuits.

Claim 10 (Original): The method of claim 9, wherein said sending, said receiving and each of said maintaining are performed in a switch contained in said connection path, said method further comprising:

maintaining a plurality of switch structures, wherein each of said plurality of switch structures stores a mapping of an identifier of each of said virtual circuit in inbound direction to another identifier of the virtual circuit in outbound direction;

mapping each identifier received in inbound direction to a correspondingidentifier in outbound direction using said plurality of switch structures.

Claim 11 (Original): The method of claim 9, wherein said first end system comprises an edge router and wherein said method is performed in said first edge router, wherein said first signaling message contains a bundle identifier which is propagated without translation by each of said plurality of switches.

Claim 12 (Original): The method of claim 11, wherein each of said plurality of virtual circuits comprises a switched virtual circuit.

Claim 13 (Previously Presented): The method of claim 1, wherein said acceptance message and said first signaling message are both formed according to a common format, wherein said common format contains a field which indicates whether a message comprises said acceptance message or said first signaling message.

Claim 14 (Original): The method of claim 13, wherein said format allows a range of virtual circuits to be specified, said format further allowing a plurality of traffic parameters to be specified for all of said range of virtual circuits, wherein said plurality of parameters in said first signaling message specify the desired parameters and said plurality of parameters in said acceptance message specify the accepted parameters.

Claim 15 (Original): The method of claim 14, further comprising sending a release message requesting release of another range of virtual circuits.

Claim 16 (Previously Presented): A method of supporting the setting up of a plurality of virtual circuits between a first end system and a second end system, said plurality of virtual circuits being set up on a network connecting said first end system to said second end system, each of said plurality of virtual circuits terminating at said first end system and said second end system, said method being performed in a device, said method comprising:

receiving from said first end system a first signaling request requesting said plurality of virtual circuits to be set up;

provisioning fewer than said plurality of virtual circuits to said second end system;

sending an acceptance message if said plurality of virtual circuits can be set up between said device and said second end system in response to said first signaling request alone, wherein said sending is performed after said provisioning;

receiving a second signaling message requesting activation of at least one of said not-yet-provisioned virtual circuits comprised in said plurality of virtual circuits;

completing provisioning of said at least one of said not-yet-provisioned virtual circuits; and

sending a completion message indicating said at least one of said not-yet-provisioned virtual circuits have been activated.

Claims 17-20 (Canceled)

Claim 21 (Previously Presented): The method of claim 16, wherein said first signaling message contains a plurality of parameters related to a range of virtual circuits comprised in said plurality of virtual circuits, said method further comprising:

storing said plurality of parameters associated with said range of virtual circuits; and

provisioning said range of virtual circuits using said plurality of parameters,

whereby said plurality of parameters are transmitted only once for provisioning said range of virtual circuits.

Claim 22 (Original): The method of claim 21, wherein said first signaling request and said second signaling message are in received in the form of ATM cells.

Claim 23 (Original): The method of claim 22, wherein said device comprises one of said first end system, said second end system and a switch in the path of said plurality of virtual circuits connecting said first end system to said second end system.

Claim 24 (Original): A device for setting up a plurality of virtual circuits between a first end system and a second end system, said plurality of virtual circuits being set up on a network connecting said first end system to said second end system, said device comprising:

an outbound interface coupled to said network;

a message construction block coupled to said outbound interface; and

a call control logic for causing said message construction block to construct a first signaling message requesting said plurality of virtual circuits to be set up, and to send said first signaling message on said network to said second end system.

Claim 25 (Original): The device of claim 24, further comprising a signaling application programming interface (API), said signaling API receiving a request for a group of virtual circuits from an external application, and communicating said request to said call control logic, wherein said call control logic causes said first signaling message to be sent in response to said request.

Claim 26 (Original): The device of claim 25, wherein said outbound interface sends said first signaling message in the form of a plurality of asynchronous transfer mode (ATM) cells, said device further comprising:

a signaling ATM adaptation layer (SAAL) output block to encapsulate data generated by said message construction block to generate said first signaling message, said SAAL output block being coupled to said outbound interface.

Claim 27 (Previously Presented): The device of claim 24, wherein said first signaling message comprises a plurality of information elements, wherein a first information element is designed to request set up of a single virtual circuit comprised in said plurality of virtual circuits, and a second information element is designed to request set up of a second plurality of virtual circuits comprised in said plurality of virtual circuits, said device further comprising:

an inbound interface designed for receiving on said network an acceptance message indicating that only said single virtual circuit is possible to be provisioned if any of a plurality of switches in a connection path between said first end system and said second end system is designed not to support said plurality of virtual circuits; and

a parser designed for examining said acceptance message and forwarding said acceptance message to said call control logic.

Claim 28 (Original): The device of claim 27, wherein said second information element comprises a non-mandatory information element according to a specification, wherein non-mandatory information elements can be ignored by said plurality of switches according to said specification.

Claim 29 (Original): The device of claim 28, wherein said specification comprises one of user to network interface (UNI) and network to network interface (NNI).

Claim 30 (Previously Presented): The device of claim 24, further comprising an inbound interface designed for receiving an acceptance message, said acceptance message indicating that a plurality of switches in a connection path between said first end system and said second end system have set up said plurality of virtual circuits.

Claim 31 (Previously Presented): The device of claim 30, wherein said plurality of switches accept said plurality of virtual circuits but immediately provision fewer than said plurality of virtual circuits, wherein said call control logic designed for causing said message

construction block to send a second signaling message to activate at least one of a plurality of not-yet-provisioned virtual circuits comprised in said plurality of virtual circuits.

Claim 32 (Previously Presented): The device of claim 30, wherein said plurality of virtual circuits is treated as a group of virtual circuits, wherein said first end system and said second end system support a plurality of groups including said group, said device further comprising a memory designed for storing a bundle structure associated with each of said plurality of groups, wherein said bundle structure stores information identifying the specific plurality of virtual circuits forming the corresponding group.

Claim 33 (Previously Presented): The device of claim 32, wherein said memory designed to further store a plurality of call reference structures and a plurality of per-VC structures,

wherein each of said plurality of call reference structures maintains the state of a call, wherein signaling messages related to each group are received on a corresponding call, and

wherein each per-VC structure stores information related to a plurality of call parameters accepted for a corresponding one of said plurality of virtual circuits.

Claim 34 (Previously Presented): The device of claim 33, wherein said device comprises a switch in said connection path, said memory designed for storing a plurality of switch structures, wherein each of said plurality of switch structures stores a mapping of an identifier of each of said virtual circuit in inbound direction to another identifier of the virtual circuit in outbound direction.

Claim 35 (Original): The device of claim 33, wherein said first end system comprises an edge router, wherein said first signaling message contains a bundle identifier which is propagated without translation by each of said plurality of switches.

Claim 36 (Original): The device of claim 30, wherein said acceptance message and said first signaling message are both formed according to a common format, wherein said

common format contains a field which indicates whether a message comprises said acceptance message or said first signaling message.

Claim 37 (Original): The device of claim 36, wherein said format allows a range of virtual circuits to be specified, said format further allowing a plurality of traffic parameters to be specified for all of said range of virtual circuits, wherein said plurality of parameters in said first signaling message specify the desired parameters and said plurality of parameters in said acceptance message specify the accepted parameters.

Claim 38 (Previously Presented): An apparatus for supporting the setting up of a plurality of virtual circuits between a first end system and a second end system, said plurality of virtual circuits being set up on a network connecting said first end system to said second end system, said plurality of virtual circuits terminating at said first end system and said second end system, said apparatus being contained in a device, said apparatus comprising:

an in-bound interface receiving from said first end system a first signaling request requesting said plurality of virtual circuits to be set up; and

a call control logic receiving said first signaling message, said call control logic sending an acceptance message if said plurality of virtual circuits can be set up between said device and said second end system in response to said first signaling request alone, wherein said call control logic provisions fewer than said plurality of virtual circuits to said second end system before sending said acceptance message,

wherein said inbound interface receives a second signaling message requesting activation of at least one of said not-yet-provisioned virtual circuits comprised in said plurality of virtual circuits, and

wherein said call control logic completes provisioning of said at least one of said not-yet-provisioned virtual circuits and then sends a completion message indicating said at least one of said not-yet-provisioned virtual circuits have been activated.

Claims 39 - 42: (Canceled)

Claim 43 (Previously Presented): The apparatus of claim 38, wherein said first signaling message contains a plurality of parameters related to a range of virtual circuits comprised in said plurality of virtual circuits, said apparatus further comprising a memory storing said plurality of parameters associated with said range of virtual circuits, wherein said call control logic provisions said range of virtual circuits using said plurality of parameters, whereby said plurality of parameters are transmitted only once for provisioning said range of virtual circuits.

Claim 44 (Previously Presented): The apparatus of claim 43, wherein said device comprises one of said first end system, said second end system and a switch in the path of said plurality of virtual circuits connecting said first end system to said second end system.

Claim 45 (Previously Presented): A device for setting up a plurality of virtual circuits between a first end system and a second end system, said plurality of virtual circuits being set up on a network connecting said first end system to said second end system, said plurality of virtual circuits terminating at said first end system and said second end system, said device being located in a communication path between said first end system and said second end system, said device comprising:

means for sending to said second end system a first signaling message requesting said plurality of virtual circuits to be set up;

means for receiving an acceptance message, said acceptance message indicating that a plurality of switches in a connection path between said first end system and said second end system have set up said plurality of virtual circuits, wherein said plurality of switches accept said plurality of virtual circuits but immediately provision fewer than said plurality of virtual circuits; and

means for sending a second signaling message to activate at least one of a plurality of not-yet-provisioned virtual circuits comprised in said plurality of virtual circuits.

Claim 46 (Original): The device of claim 45, wherein said first signaling message comprises a plurality of information elements, wherein a first information element is

designed to request set up of a single virtual circuit comprised in said plurality of virtual circuits, and a second information element is designed to request set up of a second plurality of virtual circuits comprised in said plurality of virtual circuits, said device further comprising:

means for receiving an acceptance message indicating that only said single virtual circuit is possible to be provisioned if any of a plurality of switches in a connection path between said first end system and said second end system is designed not to support said plurality of virtual circuits.

Claim 47 (Original): The device of claim 46, wherein said second information element comprises a non-mandatory information element according to a specification, wherein non-mandatory information elements can be ignored by said plurality of switches according to said specification.

Claim 48 (Original): The device of claim 47, wherein said specification comprises one of user to network interface (UNI) and network to network interface (NNI).

Claim 49 (Canceled)

Claim 50 (Canceled)

Claim 51 (Previously Presented): The device of claim 45, wherein said plurality of virtual circuits is treated as a group of virtual circuits, wherein said first end system and said second end system support a plurality of groups including said group, said device further comprising means for storing a bundle structure associated with each of said plurality of groups, wherein said bundle structure stores information identifying the specific plurality of virtual circuits forming the corresponding group.

Claim 52 (Original): The device of claim 51, further comprising:

means for storing a plurality of call reference structures, wherein each of said plurality of call reference structures maintains the state of a call, wherein signaling messages related to each group are received on a corresponding call; and

means for a plurality of per-VC structures, wherein each per-VC structure stores information related to a plurality of call parameters accepted for a corresponding one of said plurality of virtual circuits.

Claim 53 (Previously Presented): A device for supporting the setting up of a plurality of virtual circuits between a first end system and a second end system, said plurality of virtual circuits being set up on a network connecting said first end system to said second end system, each of said plurality of virtual circuits terminating at said first end system and said second end system, said device comprising:

means for receiving from said first end system a first signaling request requesting said plurality of virtual circuits to be set up;

means for provisioning fewer than said plurality of virtual circuits to said second end system;

means for sending an acceptance message after said provisioning if said plurality of virtual circuits can be set up between said device and said second end system in response to said first signaling request alone;

means for receiving a second signaling message requesting activation of at least one of said not-yet-provisioned virtual circuits comprised in said plurality of virtual circuits;

means for completing provisioning of said at least one of said not-yet-provisioned virtual circuits; and

means for sending a completion message indicating said at least one of said not-yet-provisioned virtual circuits have been activated.

Claims 54 - 57 (Canceled)

Claim 58 (Previously Presented): The device of claim 53, wherein said first signaling message contains a plurality of parameters related to a range of virtual circuits comprised in said plurality of virtual circuits, said device further comprising:

means for storing said plurality of parameters associated with said range of virtual circuits; and

means of provisioning said range of virtual circuits using said plurality of parameters,

whereby said plurality of parameters are transmitted only once for provisioning said range of virtual circuits.

Claim 59 (Previously Presented): A computer readable medium carrying one or more sequences of instructions for causing a device to set up a plurality of virtual circuits between a first end system and a second end system, said plurality of virtual circuits being set up on a network connecting said first end system to said second end system, each of said plurality of virtual circuits terminating at said first end system and said second end system, said device being located in a communication path located between said first end system and said second end system, wherein execution of said one or more sequences of instructions by one or more processors contained in said device causes said one or more processors to perform the action of:

sending to said second end system a first signaling message requesting said plurality of virtual circuits to be set up;

receiving an acceptance message, said acceptance message indicating that a plurality of switches in a connection path between said first end system and said second end system have set up said plurality of virtual circuits, wherein said plurality of switches accept said plurality of virtual circuits but immediately provision fewer than said plurality of virtual circuits; and

sending a second signaling message to activate at least one of a plurality of not-yet-provisioned virtual circuits comprised in said plurality of virtual circuits.

Claim 60 (Original): The computer readable medium of claim 59, wherein said first signaling message comprises a plurality of information elements, wherein a first information

element is designed to request set up of a single virtual circuit comprised in said plurality of virtual circuits, and a second information element is designed to request set up of a second plurality of virtual circuits comprised in said plurality of virtual circuits, further comprising:

receiving an acceptance message indicating that only said single virtual circuit is possible to be provisioned if any of a plurality of switches in a connection path between said first end system and said second end system is designed not to support said plurality of virtual circuits.

Claim 61 (Original): The computer readable medium of claim 60, wherein said second information element comprises a non-mandatory information element according to a specification, wherein non-mandatory information elements can be ignored by said plurality of switches according to said specification.

Claims 62 - 63 (Canceled)

Claim 64 (Previously Presented): The computer readable medium of claim 59, wherein said fewer than said plurality of virtual circuits corresponds to one virtual circuit such that only one virtual circuit is provisioned in response to said first signaling message.

Claim 65 (Original): The computer readable medium of claim 64, wherein said plurality of virtual circuits is treated as a group of virtual circuits, wherein said first end system and said second end system support a plurality of groups including said group, further comprising maintaining a bundle structure associated with each of said plurality of groups, wherein said bundle structure stores information identifying the specific plurality of virtual circuits forming the corresponding group.

Claim 66 (Original): The computer readable medium of claim 65, further comprising:

maintaining a plurality of call reference structures, wherein each of said plurality of call reference structures maintains the state of a call, wherein signaling messages related to each group are received on a corresponding call; and

maintaining a plurality of per-VC structures, wherein each per-VC structure stores information related to a plurality of call parameters accepted for a corresponding one of said plurality of virtual circuits.

Claim 67 (Original): The computer readable medium of claim 66, wherein said sending, said receiving and each of said maintaining are performed in a switch contained in said connection path, further comprising:

maintaining a plurality of switch structures, wherein each of said plurality of switch structures stores a mapping of an identifier of each of said virtual circuit in inbound direction to another identifier of the virtual circuit in outbound direction;

mapping each identifier received in inbound direction to a corresponding identifier in outbound direction using said plurality of switch structures.

Claim 68 (Original): The computer readable medium of claim 66, wherein said first end system comprises an edge router and wherein said actions are performed in said first edge router, wherein said first signaling message contains a bundle identifier which is propagated without translation by each of said plurality of switches.

Claim 69 (Previously Presented): The computer readable medium of claim 59, wherein said acceptance message and said first signaling message are both formed according to a common format, wherein said common format contains a field which indicates whether a message comprises said acceptance message or said first signaling message.

Claim 70 (Original): The computer readable medium of claim 69, wherein said format allows a range of virtual circuits to be specified, said format further allowing a plurality of traffic parameters to be specified for all of said range of virtual circuits, wherein said plurality of parameters in said first signaling message specify the desired parameters and said plurality of parameters in said acceptance message specify the accepted parameters.

Claim 71 (Original): The computer readable medium of claim 70, further comprising sending a release message requesting release of another range of virtual circuits.

Claim 72 (Previously Presented): A computer readable medium carrying one or more sequences of instructions for causing a device to support the setting up of a plurality of virtual circuits between a first end system and a second end system, said plurality of virtual circuits being set up on a network connecting said first end system to said second end system, each of said plurality of virtual circuits terminating at said first end system and said second end system, wherein execution of said one or more sequences of instructions by one or more processors contained in said device causes said one or more processors to perform the action of:

receiving from said first end system a first signaling request requesting said plurality of virtual circuits to be set up;

provisioning fewer than said plurality of virtual circuits to said second end system;

sending an acceptance message after said provisioning if said plurality of virtual circuits can be set up between said device and said second end system in response to said first signaling request alone.

Claims 73 - 75 (Canceled)

Claim 76 (Previously Presented): The computer readable medium of claim 72, further comprising:

receiving a second signaling message requesting activation of at least one of said not-yet-provisioned virtual circuits comprised in said plurality of virtual circuits;

completing provisioning of said at least one of said not-yet-provisioned virtual circuits; and

sending a completion message indicating said at least one of said not-yet-provisioned virtual circuits have been activated.

Claim 77 (Original): The computer readable medium of claim 76, wherein said first signaling message contains a plurality of parameters related to a range of virtual circuits comprised in said plurality of virtual circuits, further comprising:

storing said plurality of parameters associated with said range of virtual circuits; and

provisioning said range of virtual circuits using said plurality of parameters,

whereby said plurality of parameters are transmitted only once for provisioning said range of virtual circuits.

Claim 78 (Original): The method of claim 1, wherein each of said plurality of virtual circuits comprises a asynchronous transfer mode (ATM) virtual circuit provided between said first end system and said second end system.